

Chapter 4

ENVIRONMENTAL CONSEQUENCES

4.0 INTRODUCTION

This chapter presents the potential environmental, social and economic effects from the actions described in each Alternative in Chapter 2. This chapter is organized by Alternative and then resource topic.

The duration of the possible effects is analyzed and described as either short-term or long-term. As defined in the MT FEIS, short-term is up to 5 years and long-term is greater than 5 years.

Cumulative effects analysis considers the possible effects from each Alternative in combination with other relevant cumulative activities presented in Section 2.3.

4.1 EFFECTS FROM ALTERNATIVE A—NO ACTION

4.1.1 Air Quality

Direct and Indirect Effects: As no wells would be drilled, no impacts would be expected to air quality in this area.

Cumulative Effects: No wells would be drilled, so impacts from this action would not be cumulative.

4.1.2 Cultural Resources

Direct and Indirect Effects: There would be no impacts to cultural resources from this energy related development. Sites and areas of Traditional Native American concern would continue to be vulnerable to impacts from other non-energy-related developments.

Cumulative Effects: The inventory results would add to the database for acres inventoried and sites located. No new sites would be added to the National Register of Historic Places.

4.1.3 Geology and Minerals

Direct and Indirect Effects to Coal Bed Natural Gas: With no drilling and development on these private and federal leases, there would be no gas produced from leases.

Direct and Indirect Effects to Coal: There would be no effect on the coal formations under the leases.

Cumulative Effects: There would be no gas revenue to State, local and Federal governments and taxpayer mineral resources would not be protected from possible drainage of reserves by adjacent private and State wells.

4.1.4 Hydrology

Direct and Indirect Effects to Surface Water-CBNG Water Discharge to Surface Waters:

Under the no action alternative, no MPDES permit would be issued by the MDEQ. As such, no discharge to surface waters would occur. Therefore, no direct impacts to surface water resources are anticipated to result.

Direct and Indirect Effects to Surface Water-CBNG Disturbance Related:

No wells would be drilled or tested, and no roads constructed under this alternative, therefore no disturbance related impacts would result.

Direct and Indirect Effects to Groundwater:

No wells would be drilled or tested under this alternative; therefore no drawdown of groundwater would occur. Shallow groundwater would also not be impacted under the No Action Alternative.

Cumulative Effects to Surface Water-CBNG Water Discharge to Surface Waters:

Under the No Action alternative this project would not contribute to cumulative impacts, however, the other projects, which have the potential to overlap with the proposed action or any of the alternatives to create environmental impacts, are still considered. As discussed in the PRG-Coal Creek–Hydrology Technical Report, those projects that would overlap to create impacts to surface waters include the existing untreated CBNG discharge upstream from the Tongue River Reservoir (MT0030457), and the coal mines, which are addressed under the Effected Environment and the proposed discharge of treated CBNG water upstream from the Tongue River Reservoir (MT0030724). According to the MPDES permit application for the MT0030724, it would discharge at a rate of 3.79 cfs, have an EC less than 1000 $\mu\text{S}/\text{cm}$ and an SAR less than 3. The results of adding this discharge to the modeled existing conditions are shown in the table below. Detailed discussion of the model used to determine these results is included in the PRG-Coal Creek–Hydrology Technical Report.

Table 4.1.4-1: Cumulative Impacts from No Action

		Modeled Existing Conditions			Resultant Surface Water Quality and Quantity		
	Flow Conditions	Flow (cfs)	EC ($\mu\text{S}/\text{cm}$)	SAR	Flow (cfs)	EC ($\mu\text{S}/\text{cm}$)	SAR
Tongue River Below Dam	7Q10	73.6	832	1.27	77.4	831	1.29
	LMM	182.6	664	0.98	186.4	668	1.00
	HMM	1432.6	398	0.55	1436.4	402	0.56
Tongue River at Birney Day School	7Q10	52.6	1157	1.87	56.4	1155	1.88
	LMM	176.6	737	1.23	180.4	740	1.24
	HMM	1122.6	383	0.62	1126.4	387	0.63

Comparison of the cumulative resultant water quality values for the No Action alternative to the appropriate standards shows that during HMM and LMM flows, none of the mean monthly standards are exceeded. During 7Q10 flows the instantaneous maximum standards are not exceeded. These standards were adopted to protect agricultural uses of the Tongue River, which has been determined to be the most sensitive beneficial use of the Tongue River (BLM,2003a). As such, the cumulative changes in EC and SAR that are anticipated to result from the No Action alternative would not be anticipated to impair the beneficial uses of the Tongue River.

Cumulative Effects to Surface Water- Disturbance Related Impacts:

Under the No Action alternative this project would not contribute to cumulative impacts, and no other projects would overlap with the proposed action or any of the alternatives to create disturbance related environmental impacts. Therefore, no cumulative disturbance related impacts are anticipated to result under the No Action alternative.

Cumulative Effects to Groundwater:

Under the No Action alternative, this project would not contribute to cumulative impacts to groundwater, and no other projects would overlap with the proposed action or any of the alternatives to create groundwater drawdown impacts. Shallow groundwater is not anticipated to be affected by this alternative. Therefore, no cumulative impacts to groundwater are anticipated to result under the No Action alternative.

4.1.5 Indian Trust and Native American Concerns

Direct and Indirect Effects: There would be no impact to Indian Trust Assets. No development would impact air quality and no treated CBM waters would be discharged into the Tongue River. There would be no impact to cultural resources or wildlife resources under this alternative.

Cumulative Effects: There would still be concerns expressed by the Northern Cheyenne for other CBM developments and non energy related development Projects.

4.1.6 Livestock Grazing

Direct and Indirect Effects: Not affected

Cumulative Effects: Not affected

4.1.7 Social and Economic Conditions

Direct and Indirect Effects: There would be no additional drilling or development, so there would be no direct or indirect effects from the No Action alternative (see Appendix C for Social and Economic Assumptions common to all alternatives).

Cumulative Effects: There would be no additional drilling or development, so there would be no cumulative effects from the No Action alternative.

4.1.8 Soils

Direct and Indirect Effects: No wells would be drilled under the no action alternative, therefore, there would be no direct or indirect impacts from this action. There may be indirect impacts from incidental use from development activities of adjacent areas.

Cumulative Effects: Any effects from planning efforts or development on adjacent areas would not have cumulative effects to the soils of the area.

4.1.9 Vegetation

Direct and Indirect Effects to Special Status Species: No changes to the existing community.

Direct and Indirect Effects to Invasive Species: No changes to the existing community.

Cumulative Effects: Any effects from planning efforts or development on adjacent areas would not have cumulative effects to the vegetation of the area.

4.1.10 Wildlife

Direct and Indirect Effects: There would be no impacts resulting from this alternative.

Cumulative Effects: There would be no impacts from this alternative.

4.2 EFFECTS FROM ALTERNATIVE B—NO FEDERAL ACTION

4.2.1 Air Quality

Direct and Indirect Effects: Under this alternative eight private wells would be drilled. Pollutant emissions would occur in the no federal action alternative from drilling activities on adjacent fee and state leases. These emissions would impact air quality in the project area though would be less due to decreased number of total well sites disturbed and wells drilled. The primary pollutants emitted would be particulate matter with an aerodynamic diameter less than 10 microns (PM₁₀), particulate matter with an aerodynamic diameter less than 2.5 microns (PM_{2.5}), oxides of nitrogen (NO_x), carbon monoxide (CO), and sulfur dioxide (SO₂). Pollutant emissions would be short-term and localized in nature.

Maximum emissions and concentrations from drilling the wells would be expected to be in compliance with the MAAQS and NAAQS, as well as the federal PSD Class II increments. The closest PSD Class I airshed is the Northern Cheyenne Indian Reservation, which is located approximately 12.5 miles north of the proposed project. For potential effects and distances to other Class I and II airsheds, see the MT FEIS, Volume I, Chapter 4, Air and Volume II, Air Appendix. Fugitive dust and emissions during the testing phase would temporarily impact air quality due to vehicle traffic, windstorms, and venting or flaring of the gas.

Cumulative Effects: The MT FEIS analyzed cumulative air quality impacts at Class I and Class II areas from emissions sources across Montana, and in particular in southeastern Montana. The analysis used an approach that included the modeling of existing and proposed regional sources at permitted and planned emission rates, respectively.

It would be unlikely that direct air quality impacts from the no federal action alternative would violate any local, state, tribal or federal air quality standards because emissions would be far less than those analyzed in the MT FEIS. As development expands in the area, cumulative impacts to the airshed may be noticeable; however, any future development in the area would need to be approved/permitted from the appropriate agencies and any impacts from any future projects would be analyzed as part of reviewing the proposal.

4.2.2 Cultural Resources

Direct and Indirect Effects: No sites were identified on the private lands in POD boundaries. There is good potential for TCPs to occur on the private lands in the POD boundaries or to be affected by development of the private minerals. Impacts would need to be addressed by the MBOGC.

Cumulative Effects: Cumulative impacts would be similar to Alternative A. There would be no action requiring compliance with Section 106 of NHPA, since there would be no Federal action involved.

4.2.3 Geology and Minerals

Direct and Indirect Effects to Coal Bed Natural Gas: Under Alternative B, only the private wells would be drilled and tested for a short period of time but not produced. During testing of these wells, small volumes of gas, less than 30,000 cubic feet per day per well, would be lost through venting. The testing would not last longer than 6 weeks, resulting in the maximum of 1,260,000 cubic feet of gas per well. Ten private wells would be tested, thus the maximum total venting of 12,600,000 cubic feet of gas, assuming all wells would produce gas at the maximum level each day of testing.

Direct and Indirect Effects to Coal: Coal formations would be partially dewatered and small volumes of gas would be removed.

Cumulative Effects: Drilling and testing to determine the productivity of these private leases could prove up the leases and result in future gas production and revenue when the operational phase is completed. At that time, potential for drainage would be mitigated by the drilling of Federal wells where drainage of Federal mineral leases has been shown to occur.

4.2.4 Hydrology

Direct and Indirect Effects to Surface Water-CBNG Water Discharge to Surface Waters:

Under the No Federal Action alternative, the PRG Coal Creek project would discharge 0.56 cfs of treated water. Based upon the Draft MPDES permit this discharge is anticipated to have an EC of less than 1,000 $\mu\text{S}/\text{cm}$ and an SAR of less than 3. The direct effect of this discharge would be to slightly increase the EC and SAR of the stream since the EC and SAR of the discharge water are slightly higher than any of the modeled existing conditions at the point of discharge. These results are summarized on the Table below.

Table 4.2.4-1: Direct Impacts from the No Federal Action

		Modeled Existing Conditions			Resultant Surface Water Quality and Quantity		
	Flow Conditions	Flow (cfs)	EC (μS/cm)	SAR	Flow (cfs)	EC (μS/cm)	SAR
Tongue River Below Dam	7Q10	73.6	832	1.27	74.1	834	1.28
	LMM	182.6	664	0.98	183.1	666	0.99
	HMM	1432.6	398	0.55	1433.1	399	0.55
Tongue River at Birney Day School	7Q10	52.6	1157	1.87	53.1	1159	1.88
	LMM	176.6	737	1.23	177.1	738	1.23
	HMM	1122.6	383	0.62	1123.1	384	0.62

Comparison of the direct resultant water quality values for the No Federal Action alternative to the appropriate standards shows that during HMM and LMM flows, none of the mean monthly standards are exceeded. During 7Q10 flows, the instantaneous maximum standards are not exceeded. These standards were adopted to protect agricultural uses of the Tongue River, which has been determined to be the most sensitive beneficial use of the Tongue River (BLM,2003a). As such, the direct changes in EC and SAR that are anticipated to result from the No Federal Action alternative would not be anticipated to impair the beneficial uses of the Tongue River.

Direct and Indirect Effects to Surface Water-CBNG Disturbance Related:

Well drilling, road construction the installation of pipelines and underground electric lines, and the construction of the water treatment plant and discharge point would cause disturbance of vegetation, and cause corresponding increases in soil erosion potential. Increased soil erosion could cause increases in suspended sediment loads to local surface waters. The increase in suspended sediments to surface waters resulting from disturbance should be minor, based on the operator's reclamation plans.

All 8 of the proposed fee wells could be drilled without a well pad being constructed. As such, only minor surface disturbance would occur with the drilling of these wells. This disturbance would only involve digging-out of rig wheel wells (for leveling drill rig on minor slopes), reserve pit construction (estimated approximate size of 25 feet wide x 40 feet long), and compaction (from vehicles driving/parking at the drill site), for a total disturbance of 1 acre per location. Estimated disturbance associated with drilling the 8 fee wells (with 2 wells per location) would involve the disturbance of approximately 4 total acres.

A total of approximately .4 miles of two track trails, with .1 miles new two-track, would be utilized to access the POD facilities. Soil productivity would be eliminated along improved roads and severely restricted along two tracks. Short term soil erosion by wind and water could affect soil health and productivity.

Approximately 1.3 acres will be disturbed for the water treatment facility and discharge point. Zero miles of corridor would be constructed outside of roads, however approximately 100 feet of water line is located outside of the general corridors near the outfall.

Expedient reclamation of disturbed land along the roads and utilization of erosion control measures (e.g., waterbars) would ensure effects to soil productivity and stability are minimized. These disturbance related impacts should be short term, minor impacts with expedient, successful reclamation and site-stabilization, as proposed by the operator in their Surface Use Plan. Due to the low intensity of the proposed disturbance, the commitment to timely reclamation, and the presence of sediment filtering vegetation between the well sites and live water, any increases in suspended sediment loads as a result of the proposed action should be unnoticeable and of short duration.

Direct and Indirect Effects to Groundwater:

Under the No Federal Action alternative, the 8 proposed fee wells would be drilled. These 8 new wells and the 2 existing fee wells would be tested for CBNG potential for up to 6 weeks. The removal of water from the Wall and Flowers-Goodale coal seams would cause a cone of depression to form around each well. If drawdown is experienced in a water well it would cause the yield of a well to be decreased. This reduction in hydrostatic pressure may cause the well to become unusable even though some water may remain (CBNG pumps typically pump off the hydrostatic pressure to near the top of the coal seam, while not dewatering the coal seam itself since this would result in much higher water production rates, and cause the cleat within the coal to close, thereby restricting the flow of gas (Wheaton and Metesh, 2002)). Drawdown may also cause the yield from springs, which emit from the coal seams to be reduced.

It is anticipated that with 10 wells pumping (5 from each seam) the 20 foot drawdown contour may extend up to approximately 0.36 miles from the development area. The details of the model used to determine these results are discussed in detail in the PRG-Coal Creek-Hydrology Technical Report. Those wells and springs, which are located within the area of drawdown, and which receive their water from the coal seam being pumped, may be affected by this drawdown. According to MBMG's GWIC database (<http://mbmggwic.mtech.edu/>), 1 well, and no springs exist within this potential drawdown area. As shown on Table 4 this is the Bill Musgrave well in T. 8 S., R. 41 E., Section 7. Based upon the reported well depth (146 feet), and the elevation of this site based upon topographic maps (3,700 ft-amsl), this well is finished at an elevation of approximately 3,554 ft-amsl. The top of the Wall coal in this area is at approximately 3,200 ft-amsl. As such, it is not anticipated that this well will be impacted as a direct effect of this project under the No Federal Action alternative.

The operator has also certified that "all land owners within the proposed CBNG well's circle of influence are being offered a Water Well Mitigation Agreement. If a water well mitigation agreement is not reached with the landowners, the company agrees to mitigate the impacts of the CBNG wells in accordance with Montana State Water Laws". This is in compliance with the Powder River Basin Controlled Groundwater Area Order by the MBOGC (1999). This Order requires that operators offer water mitigation agreements to owners of water wells or natural springs within one mile of a CBNG field, or within the area that the operator reasonably believes may be impacted by CBNG production, whichever is greater, and to extend this area one-half mile beyond any well adversely affected. These mitigation agreements apply to any spring or well adversely impacted by CBNG wells. As such, these agreements would apply to those wells which experience an impact to their use whether it is due to decreased yields, the production of methane, or a change in water quality. Although the terms of water mitigation agreements are to be "under such conditions as the parties mutually agree upon" (MBOGC, 1999), the replacement of water required by these agreements is anticipated to take the form of reconfiguring existing wells, re-drilling wells, or drilling new wells. These processes should be effective for replacing water sources since the major drawdown from CBNG activity is anticipated to be confined to the coal seam aquifers and to only minimally affect other aquifers (such as sandstones) within the Tongue River Member of the Fort Union Formation. As such, it is anticipated that any lost water sources would be replaced with a permanent source before the termination of the agreement. The order also requires the monitoring of water sources by the CBNG operator. Data from monitoring would be provided to the affected water source owner. Impacts would not be expected after the cessation of CBNG development since the aquifer would then be in the recovery phase, with groundwater levels rising in the area that had been drawdown by CBNG development. Therefore, it is anticipated that these required water mitigation agreements would mitigate the potential impacts from groundwater drawdown, methane migration or changes in groundwater quality.

The groundwater modeling conducted in support of the MT FEIS anticipated that, for a hypothetical CBNG field with 1,082 wells producing for 20 years, the produced coal seams would recover 70% of their hydrostatic head within 5-12 years after the end of production. It is anticipated that due to the shorter duration of pumping, and the lower number of wells, that recovery for this area would be more rapid. The exact radius of the drawdown cone, and the time required for the head to recover, would depend on the site specific aquifer properties, the precise timing of the pumping of each of the wells, and the overall nature of CBNG development in this region. For additional general discussion of the anticipated drawdown related impacts, see pages 4-61 to 4-63 of the MT FEIS (BLM, 2003), and the associated groundwater modeling reports (Wheaton and Metesh 2001, Wheaton and Metesh, 2002).

The potential for cross contamination of aquifers would be avoided by cementing from the top of the produced coal zone to the surface. For further details on the drilling and cementing program, see the Master Surface Use Plan and Drilling Plan in the individual APDs.

Shallow groundwater is not anticipated to be impacted by this alternative since lining of the proposed impoundment with a 12 mil polyethylene liner will prevent the introduction of CBNG water into shallow aquifers or to the unsaturated zone.

Cumulative Effects to Surface Water-CBNG Water Discharge to Surface Waters:

If the wells associated with this alternative are productive, it is reasonably foreseeable that these leases would be fully developed and a proportional part of the requested MPDES discharge permit (MT0030660) would be used. The total discharge requested under the MPDES permit is 2.5 cfs. Since the fee wells make up 10 of 18 wells proposed, it is assumed that under this alternative the maximum discharge to the Tongue River would be 1.39 cfs of treated CBNG water from the PRG Coal Creek Project. As discussed under the No Action alternative, the proposed discharge of treated CBNG water upstream from the Tongue River Reservoir would also occur as a cumulative activity. The results of this scenario are shown in the table below. Detailed discussion of the model used to determine these results is included in the PRG-Coal Creek-Hydrology Technical Report.

Table 4.2.4-2: Cumulative Impacts from No Federal Action

		Modeled Existing Conditions			Resultant Surface Water Quality and Quantity		
	Flow Conditions	Flow (cfs)	EC (μS/cm)	SAR	Flow (cfs)	EC (μS/cm)	SAR
Tongue River Below Dam	7Q10	73.6	832	1.27	78.8	834	1.30
	LMM	182.6	664	0.98	187.8	671	1.01
	HMM	1432.6	398	0.55	1437.8	403	0.56
Tongue River at Birney Day School	7Q10	52.6	1157	1.87	57.8	1159	1.90
	LMM	176.6	737	1.23	181.8	744	1.25
	HMM	1122.6	383	0.62	1127.8	388	0.63

Comparison of the resultant water quality values for the cumulative No Federal Action alternative to the appropriate standards shows that during HMM and LMM flows, none of the mean monthly standards are exceeded. During 7Q10 flows, the instantaneous maximum standards are not exceeded. These standards were adopted to protect agricultural uses of the Tongue River, which has been determined to be the most sensitive beneficial use of the Tongue River (BLM,2003a). As such, the cumulative changes in EC and SAR that are anticipated to result from the No Federal Action alternative would not be anticipated to impair the beneficial uses of the Tongue River.

Cumulative Effects to Surface Water-CBNG Disturbance Related:

The full development of the leases, which would be tested under this proposal would cause additional disturbance, and if the testing shows these areas to have economic quantities of CBNG, it is reasonably foreseeable that these leases would be developed. The development of any of these leases would include implementation of BMPs to prevent erosion, surface use agreements, surface use plans, and proper reclamation. For this reason, it is not anticipated that cumulative disturbance related impacts would be noticeable.

Cumulative Effects to Groundwater:

If the 10 wells associated with this alternative are productive, it is reasonably foreseeable that these leases would be further produced. For this analysis it is assumed that a total of 13 CBNG wells would be completed in each coal seam under the No Federal Action alternative, and that they would be produced for up to 20 years (BLM, 2003a). The drawdown analysis indicates that for this scenario cumulative drawdown may extend up to 3.6 miles from the project area after 20 years (see the PRG-Coal Creek–Hydrology Technical Report). Those wells and springs, which are located within the area of drawdown, and which receive their water from the coal seam being pumped, may be affected by this drawdown. There are 32 wells and 13 springs located within the cumulative drawdown area that results under this alternative with 20 years of pumping. These wells and springs are listed in the PRG-Coal Creek–Hydrology Technical Report. These wells are finished at elevations between approximately 2,950 ft-amsl and 3,792 ft-amsl. The top of the Wall coal in this area is at approximately 3,200 ft-amsl, and it is approximately 55 feet thick. The top of the Flowers-Goodale coal is at approximately 2,300 ft-amsl and it is approximately 20 feet thick. Assuming a potential 25 foot error in these calculations for the elevation at which the well is finished, and the elevation of the coal bed, two wells fall into the elevation range where they may be finished in the Wall coal; the Tom Kinnison domestic well (3,224 ft-amsl), and the Kelly and Robin Legge domestic well (3,200 ft-amsl). Based upon the well logs in the GWIC database the Legge well is completed in a “Brown Sandstone (Aquifer)”. There is no lithology information for the Kinnison well, and so it may be finished in the Wall coal, and could be affected by CBNG development as a cumulative result of the No Federal Action alternative. Since the nearest known outcrop of the Wall Coal seam is approximately 11 miles away, it is not anticipated that any of the springs emit from the coal seams being tested, and they are not anticipated to be impacted by groundwater drawdown.

The operator has certified that “all land owners within the proposed CBNG well’s circle of influence are being offered a Water Well Mitigation Agreement. If a water well mitigation agreement is not reached with the landowners, the company agrees to mitigate the impacts of the CBNG wells in accordance with Montana State Water Laws”. This is in compliance with the Powder River Basin Controlled Groundwater Area designation by the MBOGC (1999). As discussed under the direct impacts section, these agreements are anticipated to mitigate impacts from groundwater drawdown.

The groundwater modeling conducted in support of the MT FEIS anticipated that, for a hypothetical CBNG field with 1,082 wells producing for 20 years, the produced coal seams would recover 70% of their hydrostatic head within 5-12 years after the end of production. It is anticipated that due to the lower number of wells, that recovery for this area would be more rapid. The exact radius of the drawdown cone, and the time required for the head to recover, would depend on the site specific aquifer properties, the precise timing of the pumping of each of the wells, and the overall nature of CBNG development in this region. For additional general discussion of the anticipated drawdown related impacts, please see pages 4-61 to 4-63 of the MT FEIS, and the associated groundwater modeling reports (Wheaton and Metesh 2001, Wheaton and Metesh, 2002).

4.2.5 Indian Trust and Native American Concerns

Direct and Indirect Effects: No Indian Trust Assets managed by the Federal government would be impacted. Concerns raised by the Northern Cheyenne Tribe would still exist for the portions of the development located on fee land/fee minerals. The Montana Board of Oil and Gas Conservation and Montana Department of Environmental Quality would address these impacts. The impacts to air Quality are addressed in the Air Quality Section. Impacts to Water Quality are addressed in the Hydrology Section. Impacts to Cultural Resources are addressed in the Cultural Resources Section. Impacts to Wildlife Resources are addressed in the Wildlife Sections.

Cumulative Effects: Partial development would add incrementally to the impacts to resources of concern to the Northern Cheyenne Tribe. Impacts to these resources would be addressed by the state agencies responsible for permitting the action.

4.2.6 Livestock Grazing

Direct and Indirect Effects: There would be minimal disturbances to livestock operations during drilling. After the produced water is treated, it would become available to the surface owners and livestock operators for watering livestock and /or irrigation purposes. Treated water that is discharged into the Tongue River would also be available for wildlife and agricultural purposes. Additional water sources would give the livestock operations more flexibility in how they use their grazing land.

Cumulative Effects: Additional water sources could enable the establishment of grazing rotation systems for livestock operators. Available water and better forage could result in increased weight gains for calves.

4.2.7 Social and Economic Conditions

Direct and Indirect Effects: Only the 8 private wells would be drilled and tested, one would be a dry hole. The wells would be shut-in for the near term. If production occurs, 2.1 BCF of CBNG would be produced having a gross value of \$8,400,000 dollars over the life of the 7 wells. The private lessees would receive \$1,050,000 million dollars of royalties and pay \$158,550 dollars in production taxes. The State would collect \$781,200 dollars in production taxes. Drilling, production and abandonment of the 8 wells would provide jobs with an estimated income of \$104,300 dollars over the life of the wells, which would enhance the social well being of those receiving this income (see Appendix C for Social and Economic Assumptions common to all alternatives).

Direct and Indirect Effects to Environmental Justice: Although American Indian Reservations are located near the project area, they would not be affected because project employees would likely commute from Sheridan, Wyoming, which is located in the opposite direction from the Reservations. Therefore, no adverse human health or environmental effects would be expected to fall disproportionately on minority or low income populations from this alternative.

Cumulative Effects: The project would be an incremental addition to the existing development and the proposed projects in southern Big Horn County. The temporary development and production jobs, and the related supplies required to service the wells over the life of the projects would likely come from the Sheridan, Wyoming area. The economic effects would be within the scope of the analysis found in the MT FEIS (2003) pages 4-116 to 4-123. The jobs would offset some of the mining jobs lost due to production declines at the Montana mines as contracts expire and productivity increases. The CBNG production taxes and royalties would also offset some of the reduced coal production taxes and royalties.

4.2.8 Soils

Direct and Indirect Effects: Under this alternative eight private wells would be drilled. The soils in the area are moderately susceptible to wind and water erosion. Overall impacts to soils from surface disturbance should be minor, based on the operator's plans. Surface disturbance would occur with drilling of the wells. This disturbance would involve digging-out of rig wheel wells (for leveling drill rig on minor slopes), reserve pit construction (estimated approximate size of 25 feet wide x 40 feet long), and compaction from vehicles driving or parking at the drill site. Estimated disturbance associated with these 8 wells would involve approximately 1 acre/location for 4 total acres. This would be a short term, minor impact with expedient, successful reclamation and site-stabilization, as committed to by the operator in their POD Surface Use Plan.

Approximately .01 acres would be disturbed miles for new two-track trails used to access well sites. The majority of proposed pipelines (gas and water) have been located in "disturbance corridors." Disturbance corridors involve the combining of 2 or more utility lines (water, gas, power) in a common trench, usually along access routes. This practice results in less surface disturbance and overall environmental impacts. Approximately 1.3 acre will be disturbed for the water treatment facility. Soil productivity will be eliminated along improved roads and severely restricted along two tracks. Short term soil erosion by wind and water could affect soil health and productivity. Expedient reclamation of disturbed land with stockpiled topsoil, proper seedbed preparation techniques, and appropriate seed mixes, along with use of erosion control measures (e.g., waterbars, water wings, culverts, rip-rap, gabions etc.) would ensure land productivity and stability will be regained and maximized.

Mitigation from the MT FEIS includes: in areas of construction, topsoil would be stockpiled separately from other material and be reused in reclamation of the disturbed areas; construction activities will be restricted during wet or muddy conditions; construction activities would be designed following BMP's to control erosion and sedimentation; erosion control measures would be maintained and continued until adequate vegetation cover is re-established; vegetation would be removed only when necessary; topsoil removed by construction activities would be stockpiled for reclamation; sensitive habitat areas would not be used for topsoil storage; topsoil piles may be required to be seeded following the surface owner use agreement; and cuts and fills for new roads would be sloped to prevent erosion and to facilitate revegetation.

Cumulative Effects: During the next 20 years, disturbances from CBNG development, conventional oil and gas development, coal mining, and other projects considered under the cumulative effects analysis would result in the short-term disturbance of about 132,000 acres of soil. These disturbances would be reduced to about 92,200 acres during the production phase of CBNG, conventional oil and gas activities and coal mining. Cumulative effects would result in lowered soil productivity and decreased soil health on these disturbed areas. In much of this acreage, soils would be taken out of production or require long periods before they can regain productivity.

4.2.9 Vegetation

Direct and Indirect Effects to Special Status Species: Construction of access roads, pipeline corridors and well sites would remove vegetation, which would reduce vegetative availability in the area by minor amounts. Compaction by equipment traffic would damage vegetation and affect productivity.

Direct and Indirect Effects to Invasive Species: Surface disturbance associated with construction of proposed access roads, pipelines and water management facilities would present opportunities for weed invasion and spread. The activities related to the performance of the proposed project would create a favorable environment for the establishment and spread of noxious weeds/invasive plants, such as salt cedar, Canada thistle, leafy spurge and perennial pepperweed.

Cumulative Effects: Species composition of some areas may be altered as a result of additional water sources. Favorable effects could result in areas where a grazing rotation system is implemented due to the available water allowing rest for areas currently receiving constant use because it is the sole water source. Negative effects could result from grazing without adequate deferment in areas that are currently ungrazed.

Montana Species of Special Concern should be minimally affected by CBNG activity. Habitat for Nuttall's desert-parsley (*Lomatium nuttallii*) and Woolly twinpod (*Physaria didymocarpa* var. *lanata*) include open rocky slopes in pine woodlands. Barr's milkvetch (*Astragalus barrii*) can occur on slopes, gumbo knobs or hilltops. Wells are usually located in areas that are easily accessible to drilling rigs and other equipment. Where possible, pipeline corridors for water, power and gas would be located along existing two tracks.

4.2.10 Wildlife

Direct and Indirect Effects: Direct impacts to wildlife resources include loss of habitat through construction activities and permanent CBNG infrastructure and mortalities resulting from collisions with vehicles and powerlines. Indirect impacts would include habitat fragmentation and displacement related to CBNG infrastructure and human-related disturbance and activities.

New CBNG infrastructure would result in the direct loss of about 1 to 3 acres of habitat. All species of wildlife inhabiting the project area would be impacted by vehicle collisions resulting from new roads and increased traffic. Using ½ and 2 mile buffers to address impacts to wildlife sensitive to disturbance/displacement, there would be about 1,400 to 11,600 acres impacted by the proposed action. The MT FEIS (pages 4-172 & 4-173) describes, in detail, the rationale for using buffers to describe indirect impacts to wildlife resources. Briefly, some species are impacted up to ½ mile by human disturbance (ie, song birds) while others may be impacted up to 2 miles by human disturbance (ie, sage grouse).

Sharp-tailed grouse would be impacted by this project from habitat disturbance/fragmentation. Roads, vehicles, structures and human activity would displace some grouse nesting activity and reduce habitat availability for brood rearing. Mortality would increase as a result of collisions with vehicles. A limited amount of marginal sage grouse habitat is located on the extreme west end of the project area. However, the landowner has taken a very active approach in reducing sagebrush vegetation with chemical applications therefore greatly reducing habitat values to sage grouse. Additionally, this area would only be impacted by an existing access trail as no drilling activity is scheduled in this area.

As mentioned in section 3.10.3, there is an active bald eagle nest located about ½ mile from the project area along the banks of the Tongue River. Several human-related disturbances are located nearby (i.e., roadway, traffic, powerline). Although this eagle pair is habituated to this disturbance, BLM in consultation with FWS, has determined this project is “likely to adversely affect” bald eagles/habitat in this area (see Biological Opinion). This determination was made considering the increased traffic and human disturbance. With no additional raptor nesting activity, this project would have minimal impact to local raptor populations.

Waterfowl, especially migrants, would be impacted by the proposed action primarily from direct human disturbance and increased traffic. This would be a minimal impact as the project area is small and the birds have considerable alternative habitat which to use. These migrant populations seem to habituate to local disturbance factors in the area.

As discussed in section 3.10.5, there are at least 104 species of birds known to use this area of southeastern Montana. With the resultant CBNG-related infrastructure (i.e., roads), habitat fragmentation and increased human disturbance, it is reasonable to assume there would be impacts to nesting and migrating neotropical bird species. The primary impacts to these species would be related to disturbance of preferred nesting habitats and increased vehicle collisions.

Impacts to aquatic species that inhabit these areas would be minor for the following reasons. (1) No water or only treated water, as approved by MDEQ, would be added to the river. (2) The water discharged (1cfs) is not expected to influence instream temperatures, dissolved oxygen or other water quality parameters due the amount of discharged flow when compared to the flows in the Tongue River (At the low monthly 7Q10 (70 cfs below the dam), the discharge would only constitute 1.5 percent of the flow). (3) Mitigation measures that are designed to reduce potential erosion and ensure adequate dissolved oxygen and temperature for aquatic life. (4) This project would incorporate the future aquatic task force monitoring plan that is identified and approved by the Powder River Basin Interagency Working Group (IWG).

Additional, impacts to wildlife resources related to CBNG development are discussed in detail in the MT FEIS, Chapter 4, pages 4-160 to 4-196.

Cumulative Effects: The impacts to aquatic and wildlife resources from cumulative impacts would be the same or similar as described above except on a much larger scale. There would be direct habitat loss from construction activities, roads and other facilities. Mortalities would occur from vehicle and powerline collisions. Indirect impacts would occur from habitat disturbance, human presence and possible diminished water quality. Between 1,400 and 11,600 acres would indirectly be impacted by this project. Additionally, between 100,000 to 200,000 acres of wildlife habitat are indirectly impacted by existing CBNG and coal mine developments within the project vicinity in Wyoming and Montana.

Local populations of certain aquatic and wildlife species groups may be impacted by the cumulative effects of current and foreseeable developments in this area. These would include species such as mule deer, sage grouse, eagles, spiny softshell turtles, etc. These species are somewhat localized to the area and rely on very key habitat areas during critical times of the year. This may include winter range for big game, nesting and brood rearing habitat for grouse and raptors and the Tongue River corridor for aquatic species.

Although difficult to quantify in numerical terms, it is reasonable to assume that, with the magnitude of cumulative industrial development in this somewhat localized landscape, there would be some impacts to most aquatic and wildlife species residing in the area that cannot be avoided.

4.3 EFFECTS FROM ALTERNATIVE C—THE PROPOSED ACTION

4.3.1 Air Quality

Direct and Indirect Effects: Pollutant emissions would occur from the proposed action during drilling activities, and these emissions would impact air quality in the project area. The primary pollutants emitted would be particulate matter with an aerodynamic diameter less than 10 microns (PM₁₀), particulate matter with an aerodynamic diameter less than 2.5 microns (PM_{2.5}), oxides of nitrogen (NO_x), carbon monoxide (CO), and sulfur dioxide (SO₂). Pollutant emissions would be short-term and localized in nature.

During the proposed action, PM₁₀ and PM_{2.5} emissions would result from travel on access roads, unpaved roads, and wind erosion at disturbed areas. NO_x, CO, and SO₂ emissions would occur from drilling engine operations, tailpipe emissions from drilling and testing service equipment, and from the emergency flares when they would be utilized. Air quality impacts at each well would be temporary - occurring during the two to three day well construction and testing at each of the 14 wells.

Air quality would be impacted in the vicinity of the project during drilling and production activities. Activities would result in a temporary increase in fugitive dust and gaseous emissions when a site is being worked in the drilling phase. Maximum emissions and concentrations would be expected to be in compliance with the MAAQS and NAAQS, as well as the federal PSD Class II increments. The closest PSD Class I airshed is the Northern Cheyenne Indian Reservation, which is located approximately 12.5 miles north of the proposed project. For potential effects and distances to other Class I and II airsheds, see the MT FEIS, Volume I, Chapter 4, Air and Volume II, Air Appendix. Fugitive dust and emissions during the testing phase would temporarily impact air quality due to vehicle traffic, windstorms and venting or flaring of the gas.

Cumulative Effects: The MT FEIS analyzed cumulative air quality impacts at Class I and Class II areas from emissions sources across Montana, and in particularly in southeastern Montana. The analysis used an approach that included the modeling of existing and proposed regional sources at permitted and planned emission rates, respectively.

It would be unlikely that direct air quality impacts from the proposed action would violate any local, state, tribal or federal air quality standards because emissions would be far less than those analyzed in the MT FEIS. As development expands in the area, cumulative impacts to the airshed may be discernible; however, any future development in the area would need to be approved/permitted from the appropriate agencies and any impacts from any future projects would be analyzed as part of reviewing the proposal.

4.3.2 Cultural Resources

Direct and Indirect Effects: The cultural resource inventory did not identify any sites that would be directly impacted by the actions proposed by the POD. A spring is identified in the POD boundaries. These are identified as culturally sensitive site types. The proposed action would not appear to effect the spring. Potential for TCP's exist in or near the POD boundaries. The location of these would be confirmed and evaluated for any effects caused by the developments in the POD. Unanticipated discoveries found during construction of road and buried infrastructure would be addressed through stipulations attached to the permits. Mitigation measures would be developed to address impacts to TCP's.

Cumulative Effects: The MT FEIS identified 5,135 cultural sites, resulting in 515 to 735 sites that could be eligible for the NRHP. This project based on inventory results, would add to the total cumulative number of sites identified in the region.

4.3.3 Geology and Minerals

Direct and Indirect Effects to Coal Bed Natural Gas: The private and federal wells would be drilled and tested for a short period of time, but not produced. During testing of these wells, small volumes of gas, less than 30,000 cubic feet per day per well, would be lost through venting. The testing would not last longer than 6 weeks, resulting in the maximum of 1,260,000 cubic feet of gas per well. Ten private and eight federal wells would be tested, thus the maximum total venting of 22,680,000 cubic feet of gas, assuming all wells would produce gas at the maximum level each day of testing.

Direct and Indirect Effects to Coal: Coal formations would be partially dewatered and small volumes of gas would be removed.

Cumulative Effects: Drilling and testing to determine the productivity of these federal and private leases could prove up the leases and result in future gas production and revenue when the operational phase is completed. At that time, potential for drainage would be mitigated.

4.3.4 Hydrology

The operator has submitted a comprehensive WMP for this project. It is incorporated-by-reference into this EA pursuant to 40 CFR 1502.21. This WMP is summarized in Chapter 2 of this EA. Qualified hydrologists, in consultation with the BLM, developed the water management plan. Adherence with the plan should minimize project area and downstream potential impacts from proposed water management strategies. The MDEQ has assumed primacy from the United States Environmental Protection Agency for issuing waste water discharge permits in the state.

The operator has proposed a variety of potential beneficial uses, however no specific beneficial uses have been identified at this time. The treated water would be suitable for all of the proposed beneficial uses. Therefore no direct, indirect, or cumulative effects would be anticipated to result from these uses. For the following analysis, it will be assumed that all produced water would be treated and discharged to the Tongue River since any beneficial uses in and around the Coal Creek POD area would simply decrease the magnitude of the predicted direct, indirect, and cumulative impacts. If specific beneficial uses are identified they will be submitted at that time via Sundry notice to the BLM, and analyzed through NEPA to ensure compliance with Onshore Order Number 7, the CWA, and all other applicable Federal, State or local laws.

Direct and Indirect Effects to Surface Water-CBNG Water Discharge to Surface Waters:

Under the Proposed Action alternative, the PRG Coal Creek project would discharge 1.0 cfs of treated water under MPDES permit MT0030660. Based upon the Draft MPDES permit this discharge is anticipated to have an EC of less than 1,000 $\mu\text{S}/\text{cm}$ and an SAR of less than 3. The direct effect of this discharge would be to slightly increase the EC and SAR of the stream since the EC and SAR of the discharge water are slightly higher than any of the modeled existing conditions at the discharge point. These results are summarized on the Table below.

Table 4.3.4-1: Direct Impacts from the Proposed Action

		Modeled Existing Conditions			Resultant Surface Water Quality and Quantity		
	Flow Conditions	Flow (cfs)	EC ($\mu\text{S}/\text{cm}$)	SAR	Flow (cfs)	EC ($\mu\text{S}/\text{cm}$)	SAR
Tongue River Below Dam	7Q10	73.6	832	1.27	74.6	835	1.29
	LMM	182.6	664	0.98	183.6	667	0.99
	HMM	1432.6	398	0.55	1433.6	399	0.55
Tongue River at Birney Day School	7Q10	52.6	1157	1.87	53.6	1160	1.88
	LMM	176.6	737	1.23	177.6	740	1.23
	HMM	1122.6	383	0.62	1123.6	384	0.62

Comparison of the direct resultant water quality values for the Proposed Action alternative to the appropriate standards shows that during HMM and LMM flows, none of the mean monthly standards are exceeded. During 7Q10 flows, the instantaneous maximum standards are not exceeded. These standards were adopted to protect agricultural uses of the Tongue River, which has been determined to be the most sensitive beneficial use of the Tongue River (BLM,2003a). As such, the direct changes in EC and SAR that are anticipated to result from the Proposed Action alternative would not be anticipated to impair the beneficial uses of the Tongue River.

Direct and Indirect Effects to Surface Water-CBNG Disturbance Related:

Three of the four proposed federal well locations and all of the fee well locations can be drilled without a well pad being constructed. As such, only minor surface disturbance would occur with the drilling of these wells. This disturbance would only involve digging-out of rig wheel wells (for leveling drill rig on minor slopes), reserve pit construction (estimated approximate size of 25feet wide x 40 feet long), and compaction (from vehicles driving/parking at the drill site), for a total disturbance of 1 acre per location for a total of approximately 7 acres of disturbance. One of the federal well locations (11-6) would require a well pad to be constructed, resulting in a mechanical disturbance of 0.5 acres, and associated minor disturbance due to compaction of 0.5 acres. Estimated disturbance at the 8 drilling locations would involve the disturbance of approximately 8 total acres. This should be a

short term, minor impact with expedient, successful reclamation and site-stabilization, as committed to by the operator in their POD Master Surface Use Plan and as required by BLM in the Conditions of Approval (COAs). The constructed well pad would not be reclaimed until the wells are plugged and abandoned.

A total of approximately 6 miles of two track trails, with 1.5 miles new two-track, would be utilized to access the POD facilities. Soil productivity would be eliminated along improved roads and severely restricted along two tracks. Short term soil erosion by wind and water could affect soil health and productivity.

Approximately 1.3 acres will be disturbed for the water treatment facility and discharge point. Two tenths of a mile of corridor would be constructed outside of roads, however approximately 100 feet of water line is located outside of the general corridors near the outfall.

Due to the low intensity of the proposed disturbance, the commitment to timely reclamation, and the presence of sediment filtering vegetation between the well sites and live water, any increases in suspended sediment loads as a result of the proposed action would be unnoticeable and of short duration.

Expedient reclamation of disturbed land along the roads and utilization of erosion control measures (e.g., waterbars) would ensure effects to soil productivity and stability are minimized. These disturbance related impacts should be short term, minor impacts with expedient, successful reclamation and site-stabilization, as committed to by the operator in their POD Master Surface Use Plan. Due to the low intensity of the proposed disturbance, the commitment to timely reclamation, and the presence of sediment filtering vegetation between the well sites and live water, any increases in suspended sediment loads as a result of the proposed action should be unnoticeable and of short duration.

Direct and Indirect Effects to Groundwater:

Under the Proposed Action alternative, the 8 proposed fee wells and the 8 proposed federal wells would be drilled. These 16 new wells and the 2 existing fee wells would be tested for CBNG potential. This testing may last for up to 6 weeks. The removal of water from the Wall and Flowers-Goodale coal seams would cause a cone of depression to form around each well. It is anticipated that with 18 wells pumping (9 from each seam), the 20 foot drawdown contour may extend approximately 0.48 miles from the POD area after 6 weeks of pumping. The details of the model used to determine these results are discussed in detail in the PRG-Coal Creek-Hydrology Technical Report. Those wells and springs, which are located within the area of drawdown, and which receive their water from the coal seam being pumped, may be affected by this drawdown. According to MBMG's GWIC database (<http://mbmggwic.mtech.edu/>), only the Musgrave well is located within this drawdown area. As discussed under the No Federal Action alternative, this well is finished at an elevation of approximately 3,554 ft-amsl while the top of the Wall coal in this area is at approximately 3,200 ft-amsl. As such it is not anticipated that this well will be impacted as a direct effect of this project under the Proposed Action alternative.

The operator has certified that "all land owners within the proposed CBNG well's circle of influence are being offered a Water Well Mitigation Agreement. If a water well mitigation agreement is not reached with the landowners, the company agrees to mitigate the impacts of the CBNG wells in accordance with Montana State Water Laws". This is in compliance with the Powder River Basin Controlled Groundwater Area Order by the MBOGC (1999). This Order requires that operators offer water mitigation agreements to owners of water wells or natural springs within one mile of a CBNG field, or within the area that the operator reasonably believes may be impacted by CBNG production, whichever is greater, and to extend this area one-half mile beyond any well adversely affected. These mitigation agreements apply to any spring or well adversely impacted by CBNG wells. As such, these agreements would apply to those wells which experience an impact to their use whether it is due to decreased yields, the production of methane, or a change in water quality. Although the terms of water mitigation agreements are to be "under such conditions as the parties mutually agree upon" (MBOGC, 1999), the replacement of water required by these agreements is anticipated to take the form of reconfiguring existing wells, re-drilling wells, or drilling new wells. These processes should be effective for replacing water sources since the major drawdown from CBNG activity is anticipated to be confined to the coal seam aquifers and to only minimally affect other aquifers (such as sandstones) within the Tongue River Member of the Fort Union Formation. As such, it is anticipated that any lost water sources would be replaced with a permanent source before the termination of the agreement. The order also requires the monitoring of water sources by the CBNG operator. Data from monitoring

would be provided to the affected water source owner. Impacts would not be expected after the cessation of CBNG development since the aquifer would then be in the recovery phase, with groundwater levels rising in the area that had been drawdown by CBNG development. Therefore, it is anticipated that these required water mitigation agreements would mitigate the potential impacts from groundwater drawdown, methane migration or changes in groundwater quality.

The groundwater modeling conducted in support of the MT FEIS anticipated that for a hypothetical CBNG field with 1,082 wells producing for 20 years, the produced coal seams would recover 70% of their hydrostatic head within 5-12 years after the end of production. It is anticipated that, due to the shorter duration of pumping and the lower number of wells, that recovery for this area would be more rapid. The exact radius of the drawdown cone, and the time required for the head to recover, would depend on the site specific aquifer properties, the precise timing of the pumping of each of the wells, and the overall nature of CBNG development in this region. For additional general discussion of the anticipated drawdown related impacts, see pages 4-61 to 4-63 of the MT FEIS (BLM, 2003), and the associated groundwater modeling reports (Wheaton and Metesh 2001, Wheaton and Metesh, 2002).

The potential for cross contamination of aquifers would be avoided by cementing from the top of the produced coal zone to the surface. For further details on the drilling and cementing program, see the Master Surface Use Plan and Drilling Plan in the individual APDs.

Shallow groundwater is not anticipated to be impacted by this alternative since lining of the proposed impoundment with a 12 mil polyethylene liner will prevent the introduction of CBNG water into shallow aquifers or to the unsaturated zone.

Cumulative Effects to Surface Water-CBNG Water Discharge to Surface Waters:

If the wells associated with this alternative are productive, it is reasonably foreseeable that the total discharge requested under the MPDES permit (MT0030660) would be used. Therefore, it is assumed that under this alternative, 2.5 cfs of treated CBNG water would be cumulatively discharged from the PRG Coal Creek Project. As discussed under the No Action alternative, the proposed discharge of treated CBNG water upstream from the Tongue River Reservoir (MT0030724) would also occur as a cumulative activity. The results of this scenario are shown in the table below. Detailed discussion of the model used to determine these results is included in the PRG-Coal Creek-Hydrology Technical Report.

Table 4.3.4-2: Cumulative Impacts from the Proposed Action

		Modeled Existing Conditions			Resultant Surface Water Quality and Quantity		
	Flow Conditions	Flow (cfs)	EC (μS/cm)	SAR	Flow (cfs)	EC (μS/cm)	SAR
Tongue River Below Dam	7Q10	73.6	832	1.27	79.9	837	1.31
	LMM	182.6	664	0.98	188.9	674	1.02
	HMM	1432.6	398	0.55	1438.9	404	0.56
Tongue River at Birney Day School	7Q10	52.6	1157	1.87	58.9	1162	1.91
	LMM	176.6	737	1.23	182.9	747	1.26
	HMM	1122.6	383	0.62	1128.9	388	0.63

Comparison of the cumulative resultant water quality values for the Proposed Action alternative to the appropriate standards shows that during HMM and LMM flows, none of the mean monthly standards are exceeded. During 7Q10 flows, the instantaneous maximum standards are not exceeded. These standards were adopted to protect agricultural uses of the Tongue River, which has been determined to be the most sensitive beneficial use of the Tongue River (BLM,2003a). As such, the cumulative changes in EC and SAR that are anticipated to result from the Proposed Action alternative would not be anticipated to impair the beneficial uses of the Tongue River.

Cumulative Effects to Surface Water-CBNG Disturbance Related:

The full development of the leases, which would be tested under this proposal would cause additional disturbance, and if the testing shows these areas to have economic quantities of CBNG, it is reasonably foreseeable that these leases would be developed. The development of any of these leases would include implementation of BMPs to prevent erosion, surface use agreements, surface use plans, and proper reclamation. For this reason, it is not anticipated that cumulative disturbance related impacts would be noticeable.

Cumulative Effects to Groundwater:

If the 18 wells associated with this alternative are productive, it is reasonably foreseeable that these leases would be further produced. For this analysis it is assumed that a total of 23 CBNG wells would be completed in each coal seam under the Proposed Action alternative, and that they would be produced for up to 20 years (BLM, 2003a). The drawdown analysis indicates that for this scenario cumulative drawdown may extend up to 4.7 miles from the project area after 20 years (see the PRG-Coal Creek-Hydrology Technical Report). Those wells and springs, which are located within the area of drawdown, and which receive their water from the coal seam being pumped, may be affected by this drawdown. There are 58 wells and 19 springs located within the cumulative drawdown area that results under this alternative with 20 years of pumping. These wells and springs are listed in the PRG-Coal Creek-Hydrology Technical Report. These wells are finished at elevations between approximately 2,897 ft-amsl and 3,904 ft-amsl. The top of the Wall coal in this area is at approximately 3,200 ft-amsl, and it is approximately 55 feet thick. The top of the Flowers-Goodale coal is at approximately 2,300 ft-amsl and it is approximately 20 feet thick. Assuming a potential 25 foot error in these calculations for the elevation at which the well is finished, and the elevation of the coal bed, a total of 5 wells have the potential to be finished in the coal seams being developed. These include the Legge and Kinnison domestic wells discussed under the cumulative impacts section of the No Federal Action alternative, the Petre Preston domestic well (3,212 ft-amsl), the Preston Pete * 10 MI SW Birney Montana domestic well (3,216 ft-amsl), and the Decker Coal Co. monitoring well (3,249 ft-amsl). Based upon the well logs in the GWIC database the Legge well is completed in a "Brown Sandstone (Aquifer)". There is no lithology information for the Kinnison well, and so it may be finished in the Wall coal, and could be affected by CBNG development as a cumulative result of the Proposed Action alternative. Both Preston domestic wells are listed in the GWIC database as being finished in the alluvial aquifer adjacent to the Tongue River. Thus these domestic wells would not be anticipated to experience drawdown since they are not finished in the aquifer being drawdown. The Decker monitoring well is completed in a coal seam. Therefore, the monitoring well has the potential to be drawdown under the cumulative Proposed Action Alternative. Since the nearest known outcrop of the Wall Coal seam is approximately 11 miles away, it is not anticipated that any of the springs emit from the coal seams being tested, and they are not anticipated to be impacted by groundwater drawdown.

The operator has certified that "all land owners within the proposed CBNG well's circle of influence are being offered a Water Well Mitigation Agreement. If a water well mitigation agreement is not reached with the landowners, the company agrees to mitigate the impacts of the CBNG wells in accordance with Montana State Water Laws" this is in compliance with the Powder River Basin Controlled Groundwater Area designation by the MBOGC (1999). As discussed under the direct impacts section, these agreements are anticipated to mitigate impacts from groundwater drawdown.

The groundwater modeling conducted in support of the MT FEIS anticipated that for a hypothetical CBNG field with 1,082 wells producing for 20 years, the produced coal seams would recover 70% of their hydrostatic head within 5-12 years after the end of production. It is anticipated that due to the lower number of wells, recovery for this area would be more rapid. The exact radius of the drawdown cone, and the time required for the head to recover, would depend on the site specific aquifer properties, the precise timing of the pumping of each of the wells, and the overall nature of CBNG development in this region. For additional general discussion of the anticipated drawdown related impacts, please see pages 4-61 to 4-63 of the MT FEIS, and the associated groundwater modeling reports (Wheaton and Metesh 2001, Wheaton and Metesh, 2002).

4.3.5 Indian Trust and Native American Concerns

Direct and Indirect Effects: Impacts would be similar to those identified in Alternative B. BLM would ensure that the project would not impair water quality on the Tongue River or impact the Northern Cheyenne Class I Air Quality. Impacts to other concerns raised by the Northern Cheyenne Tribe would be addressed in the appropriate technical sections of the EA.

Cumulative Effects: The proposed action would incrementally add to the concerns about CBM development identified by the Northern Cheyenne Tribe. Cumulative impacts would be similar to those identified in Alternative B. Where appropriate BLM would develop mitigation measure to eliminate or lessen impacts to resources of concern to the Northern Cheyenne Tribe.

4.3.6 Livestock Grazing

Direct and Indirect Effects: Same as Alternative B

Cumulative Effects: Same as Alternative B

4.3.7 Social and Economic Conditions

Direct and Indirect Effects: Powder River Gas would drill and test 16 CBNG wells with 80 acre well density. Eight Federal wells and eight private wells would be drilled, tested and shut-in for the near term. One federal and one private well would be dry holes. If production occurs, 4.2 BCF of CBNG would be produced, from the 14 wells, having a gross value of \$16,800,000 over the life of the wells. The private lessees would receive \$1,050,000 of royalties and pay \$158,550 in production taxes. The Federal royalties would be \$1,050,000. The State would collect \$1,562,400 in production taxes, and receive 50 percent of the Federal royalties, \$525,000. Drilling, production and abandonment of the 16 wells would provide jobs with an estimated income of \$208,600 over the life of the wells, which would enhance the social well being of those receiving this income (see Appendix C for Social and Economic Assumptions common to all alternatives).

Direct and Indirect Effects to Environmental Justice: Although American Indian Reservations are located near the project area, they would not be affected because project employees would likely commute from Sheridan, Wyoming, which is located in the opposite direction from the Reservations. Therefore, no adverse human health or environmental effects would be expected to fall disproportionately on minority or low income populations from this alternative.

Cumulative Effects: The project would be an incremental addition to the existing development and the proposed projects in southern Big Horn County. The temporary development and production jobs, and the related supplies required to service the wells over the life of the projects would likely come from the Sheridan, Wyoming area. The economic effects would be within the scope of the analysis found in the MT FEIS (2003) pages 4-116 to 4-123. The jobs would offset some of the mining jobs lost due to production declines at the Montana mines as contracts expire and productivity increases. The CBNG production taxes and royalties would also offset some of the reduced coal production taxes and royalties.

4.3.8 Soils

Direct and Indirect Effects: The soils in the area are moderately susceptible to wind and water erosion. Overall impacts to soils from surface disturbance should be minor, based on the operator's plans and BLM applied mitigation. Surface disturbance would occur with drilling of the wells. This disturbance would involve digging-out of rig wheel wells (for leveling drill rig on minor slopes), reserve pit construction (estimated approximate size of 25 feet wide x 40 feet long), and compaction from vehicles driving or parking at the drill site. Estimated disturbance associated with these 16 wells would involve approximately 1 acre/location for 8 total acres. This would be a short term, minor impact with expedient, successful reclamation and site-stabilization, as committed to by the operator in their POD Surface Use Plan and as required by BLM in COAs.

Approximately 1.5 miles of new and 4.5 miles of existing two-track trails would be used to access well sites. The majority of proposed pipelines (gas and water) have been located in "disturbance corridors." Disturbance corridors involve the combining of 2 or more utility lines (water, gas, power) in a common trench, usually along access routes. This practice results in less surface disturbance and overall environmental impacts. Approximately 1.3 acres will be disturbed for the water treatment facility. Soil productivity would be eliminated along improved roads and severely restricted along two tracks. Short term soil erosion by wind and water could affect soil health and productivity. Expedient reclamation of disturbed land with stockpiled topsoil, proper seedbed preparation techniques, and appropriate seed mixes, along with use of erosion control measures (e.g., waterbars, water wings, culverts, rip-rap, gabions, etc.) would ensure land productivity and stability would be regained and maximized.

Mitigation from the MT FEIS includes: in areas of construction, topsoil would be stockpiled separately from other material and be reused in reclamation of the disturbed areas; construction activities would be restricted during wet or muddy conditions; construction activities would be designed following BMP's to control erosion and sedimentation; erosion control measures would be maintained and continued until adequate vegetation cover is re-established; vegetation would be removed only when necessary; topsoil removed by construction activities would be stockpiled for reclamation; sensitive habitat areas would not be used for topsoil storage; topsoil piles may be required to be seeded following the BLM seeding policy; and cuts and fills for new roads would be sloped to prevent erosion and to facilitate revegetation.

Cumulative Effects: During the next 20 years, disturbances from CBNG development, conventional oil and gas development, coal mining, and other projects considered under the cumulative effects analysis would result in the short-term disturbance of about 132,000 acres of soil. These disturbances would be reduced to about 92,200 acres during the production phase of CBNG, conventional oil and gas activities and coal mining. Cumulative effects would result in lowered soil productivity and decreased soil health on these disturbed areas. In much of this acreage, soils would be taken out of production or require long periods before they can regain productivity.

4.3.9 Vegetation

Direct and Indirect Effects to Special Status Species: Similar to Alternative B, however approximately 6 additional acres of disturbance would be associated with the addition of the federal wells and two track trails.

Direct and Indirect Effects to Invasive Species: Same as Alternative B.

Cumulative Effects: Similar to Alternative B, however, more acres would be involved.

4.3.10 Wildlife

Direct and Indirect Effects: Impacts to aquatic and wildlife resources with this alternative are essentially the same as those described in Alternative B. The increased disturbances with this alternative when compared to those in Alt. B, ie., 3 acres of lost habitat vs. 7 acres of lost habitat, 1 mile of road vs. 3 miles of roads, etc are not considered significant enough to warrant additional analysis.

However, in order to ensure the maximum protection to wildlife habitat, this alternative requires a Wildlife Monitoring and Protection Plan (WMPP) be implemented. As required in this plan, key wildlife species would be monitored annually throughout the life of the project, power lines would be built to standards identified by the Avian Power Line Interaction Committee (1996), and to additional standards outlined in the Biological Opinion: signing, speed limits, or speed bumps would be placed on all project access roads to reduce mortality and disturbance caused by vehicle traffic and temporary and permanent access roads would be avoided on south-facing slopes within big game winter range.

Additionally, many of the requirements in the MT FEIS and CBNG Preparation Guidebook were designed to reduce impacts to aquatic and wildlife and other natural resources. Examples of the requirements outlined in the above mentioned documents include measures, such as burying power lines wherever possible, minimizing road and well pad construction, and the use of disturbance corridors for combining utility lines and access roads. It will be recommended that all CBNG wells use remote monitoring. The use of remote monitoring would minimize the need to visit well locations, resulting in fewer disturbances to wildlife and their habitat.

Cumulative Effects: The impacts to aquatic and wildlife resources from cumulative impacts under this alternative would be the same as described above (see Wildlife 4.2.10).